OBSERVATIONS & RECOMMENDATIONS

After reviewing data collected from **DEERING LAKE** the program coordinators recommend the following actions.

FIGURE INTERPRETATION

- Figure 1: These graphs illustrate concentrations of chlorophyll-a in the water column. Algae are microscopic plants that are a natural part of lake ecosystems. Algae contain chlorophyll-a, a pigment necessary for photosynthesis. A measure of chlorophyll-a can indicate the abundance of algae in a lake. The historical data (the bottom graph) show a *stable* in-lake chlorophyll-a trend. Chlorophyll-a concentrations have remained well below the New Hampshire mean, and decreased this season even though we experienced an increase in rainfall. While algae are present in all lakes, an excess amount of any type is not welcomed. Concentrations can increase when there are external and internal sources of phosphorus, which is the nutrient algae depend upon for growth. It's important to continue the education process and keep residents aware of the sources of phosphorus and how it influences lake quality.

- Figure 2: Water clarity is measured by using a Secchi disk. Clarity, or transparency, can be influenced by such things as algae, sediments from erosion, and natural colors of the water. The graphs on this page show historical and current year data. The lower graph shows a *fairly stable* trend in lake transparency. Water clarity decreased in 1998 and 1999, but this year's results were slightly better than last year's. Transparency results remain above the average for New Hampshire lakes. The 2000 sampling season was considered to be wet and, therefore, average transparency readings are expected to be slightly lower than last year's readings. Higher amounts of rainfall usually cause more eroding of sediments into the lake and streams, thus decreasing clarity.

- Figure 3: These figures show the amounts of phosphorus in the epilimnion (the upper layer in the lake) and the hypolimnion (the lower layer); the inset graphs show current year data. Phosphorus is the limiting nutrient for plants and algae in New Hampshire waters. Too much phosphorus in a lake can lead to increases in plant growth over time. The upper graph shows a *variable* trend for epilimnetic phosphorus levels. The bottom graph shows a *fairly stable* trend for hypolimnetic phosphorus levels, despite the increase from the 1999 season. The mean epilimnetic phosphorus concentration was below the state median again this year, while the hypolimnetic average was above the median. The large spike in phosphorus concentration in the hypolimnion for September was likely caused by high turbidity observed in the sample. Contamination of the sample with bottom sediment can cause an increase in phosphorus concentrations. One of the most important approaches to reducing phosphorus levels is educating the public. Humans introduce phosphorus to lakes by several means: fertilizing lawns, septic system failures, and detergents containing phosphates are just a few. Keeping the public aware of ways to reduce the input of phosphorus to lakes means less productivity in the lake. Contact the VLAP coordinator for tips on educating your lake residents or for ideas on testing your watershed for phosphorus inputs.

OTHER COMMENTS

- As an update from the 1999 report, the average phosphorus value in the Main Inlet was again decreased this year (Table 8). The Morrotta Inlet, however, was slightly increased from the 1999 data. The mean of both inlets fell within the average range for phosphorus in New Hampshire waters. This is an improvement, given that both have had results considered to be excessive. We suggested in last year's report that the higher results might occur during wetter summers, but that was not the case this year. We will continue to watch both inlets for low phosphorus results, and if the higher levels return we will suggest a more stringent sampling of the inlets.

- Conductivity levels continued to increase in the following locations this year: in-lake (all layers), Outlet, and Zowski Inlet (Table 6). There was not an excessive increase in any of the stations listed, and it should be noted that this summer there was less variability between the minimum and maximum values than the 1999 results.

- Conductivity levels decreased in the Main Inlet, although not to the low levels observed prior to 1998, and also in Morrotta Inlet (Table 6). Again, we will observe these inlets for continual decreases in conductivity.

- Dissolved oxygen levels were low from 8-meters to the bottom of the lake in July (Table 9). The other readings were high enough to support aquatic life. We would like to schedule our annual visit for 2001 in August. The lake has not been tested for dissolved oxygen at this time of the season. It is likely that the oxygen levels are more depleted in August, which may be creating internal phosphorus loading. Contact the VLAP Coordinator at (603) 271-2658 to schedule an appointment.

NOTES

- Monitor's Note (7/17/00): 2 Loons seen.

- Monitor's Note (8/20/00): Very windy.

USEFUL RESOURCES

Lake Eutrophication, *WD-BB-3*, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

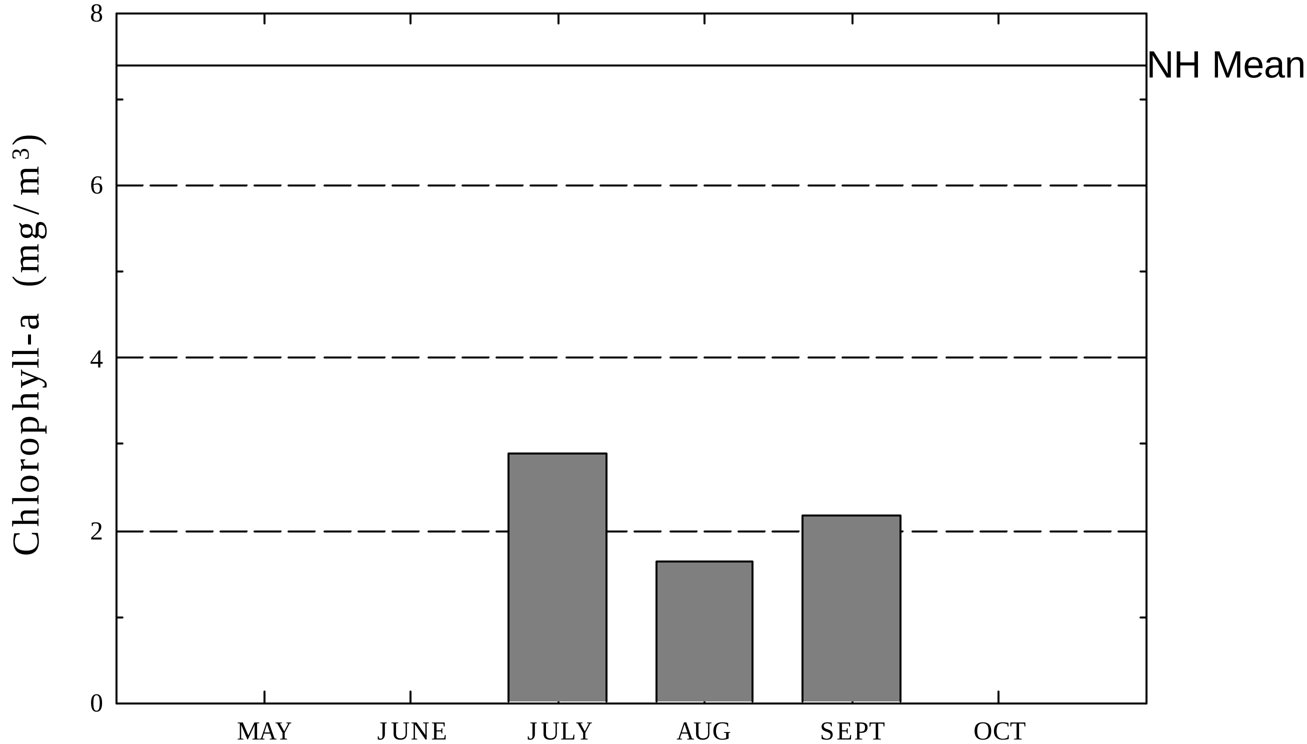
Phosphorus in Lakes, WD-BB-20, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

Answers to Common Lake Questions, NHDES-WSPCD-92-12, NHDES Booklet, (603) 271-3503.

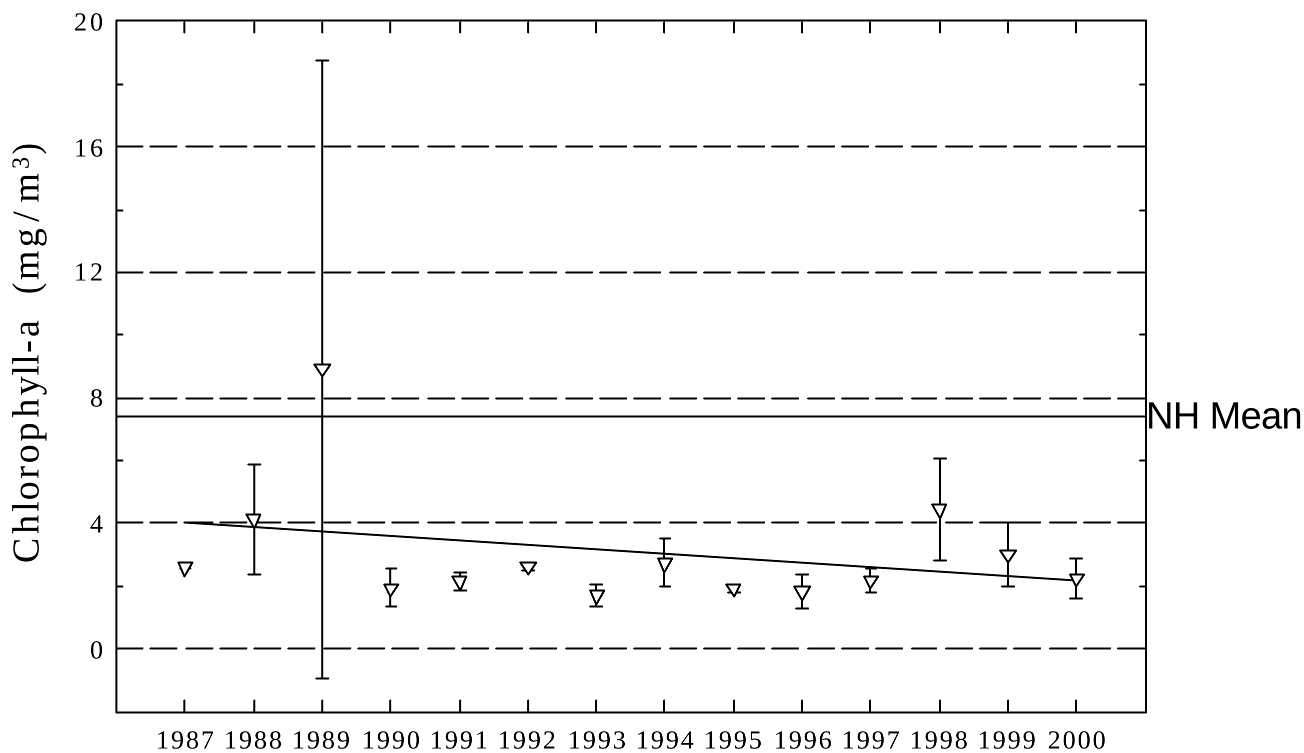
Through the Looking Glass: A Field Guide to Aquatic Plants. North American Lake Management Society, 1988. (608) 233-2836 or www.nalms.org

Deering Lake

Figure 1. Monthly and Historical Chlorophyll-a Results



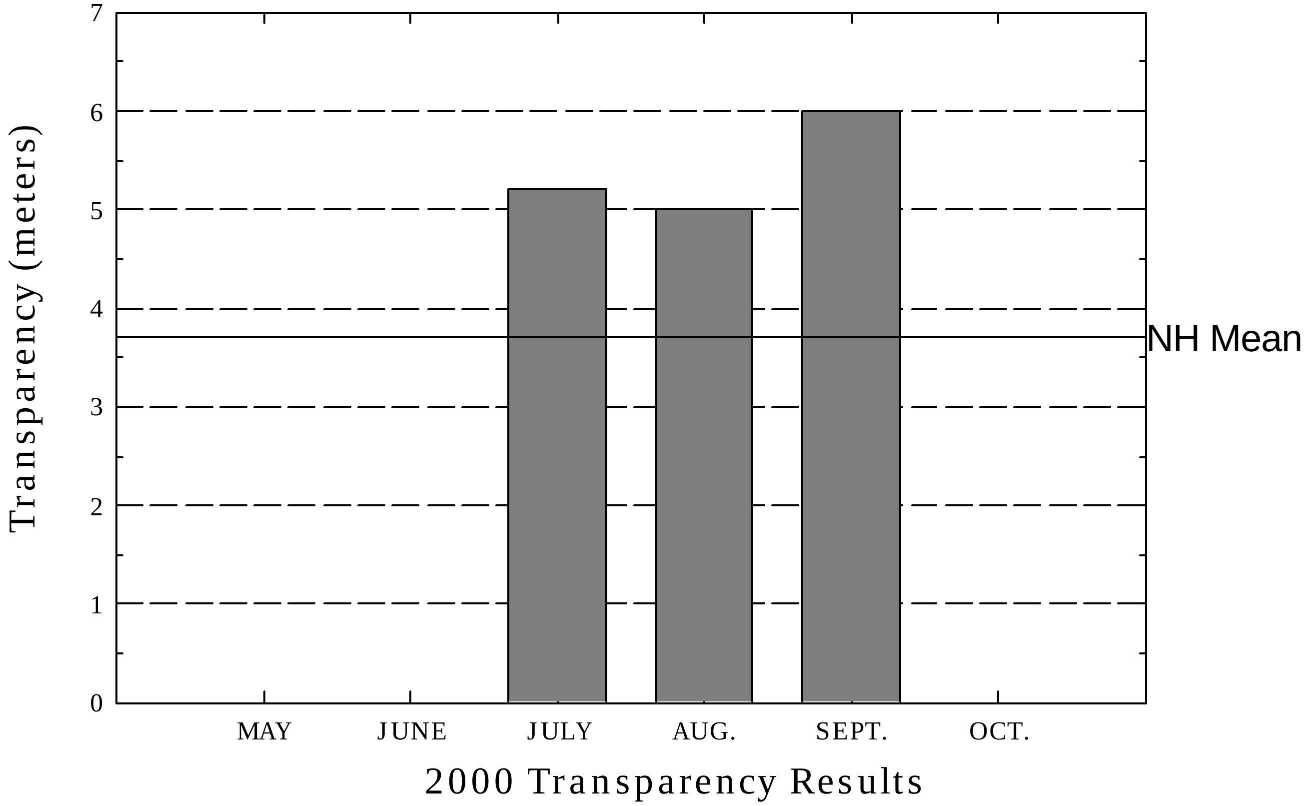
2000 Chlorophyll-a Results

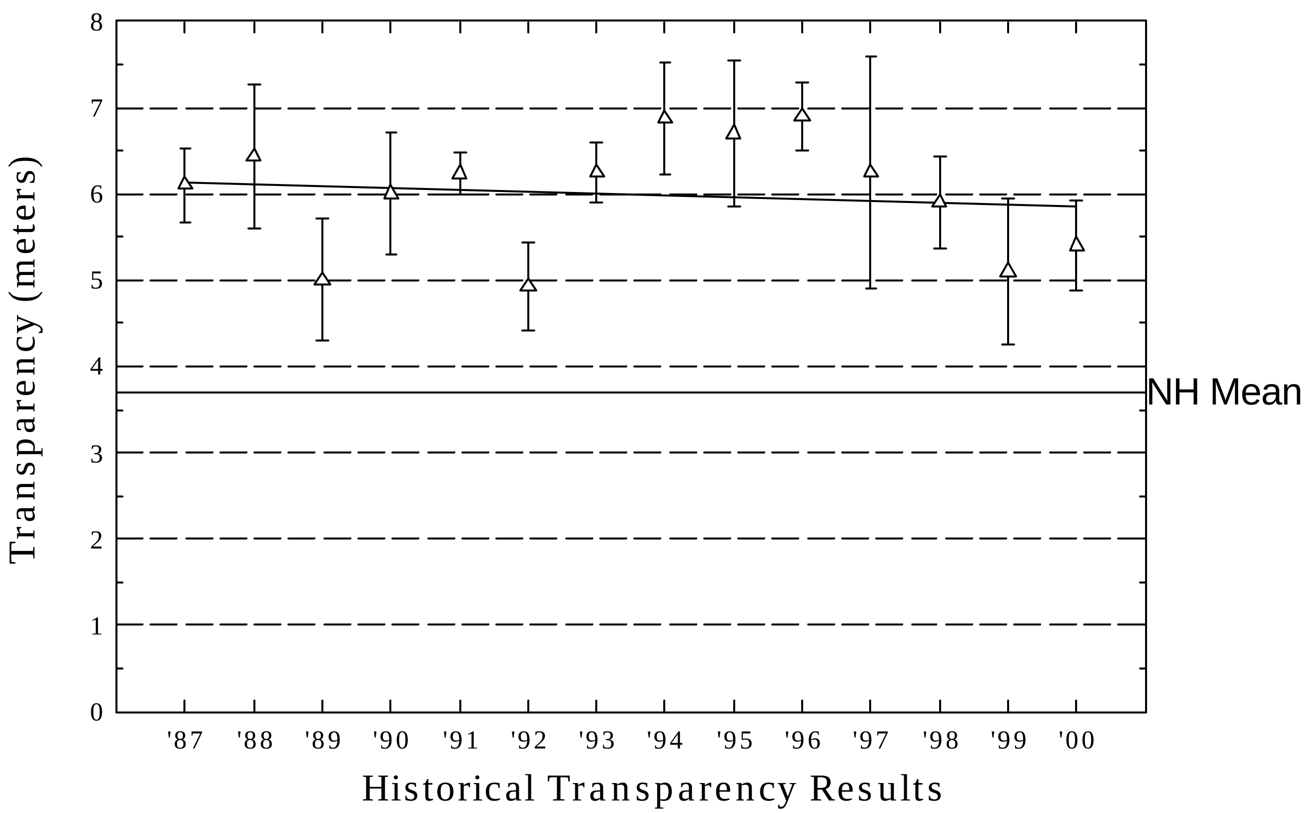


Historical Chlorophyll-a Results

Deering Lake

Figure 2. Monthly and Historical Transparency Results





Deering Lake

Figure 3. Monthly and Historical Total Phosphorus Data.

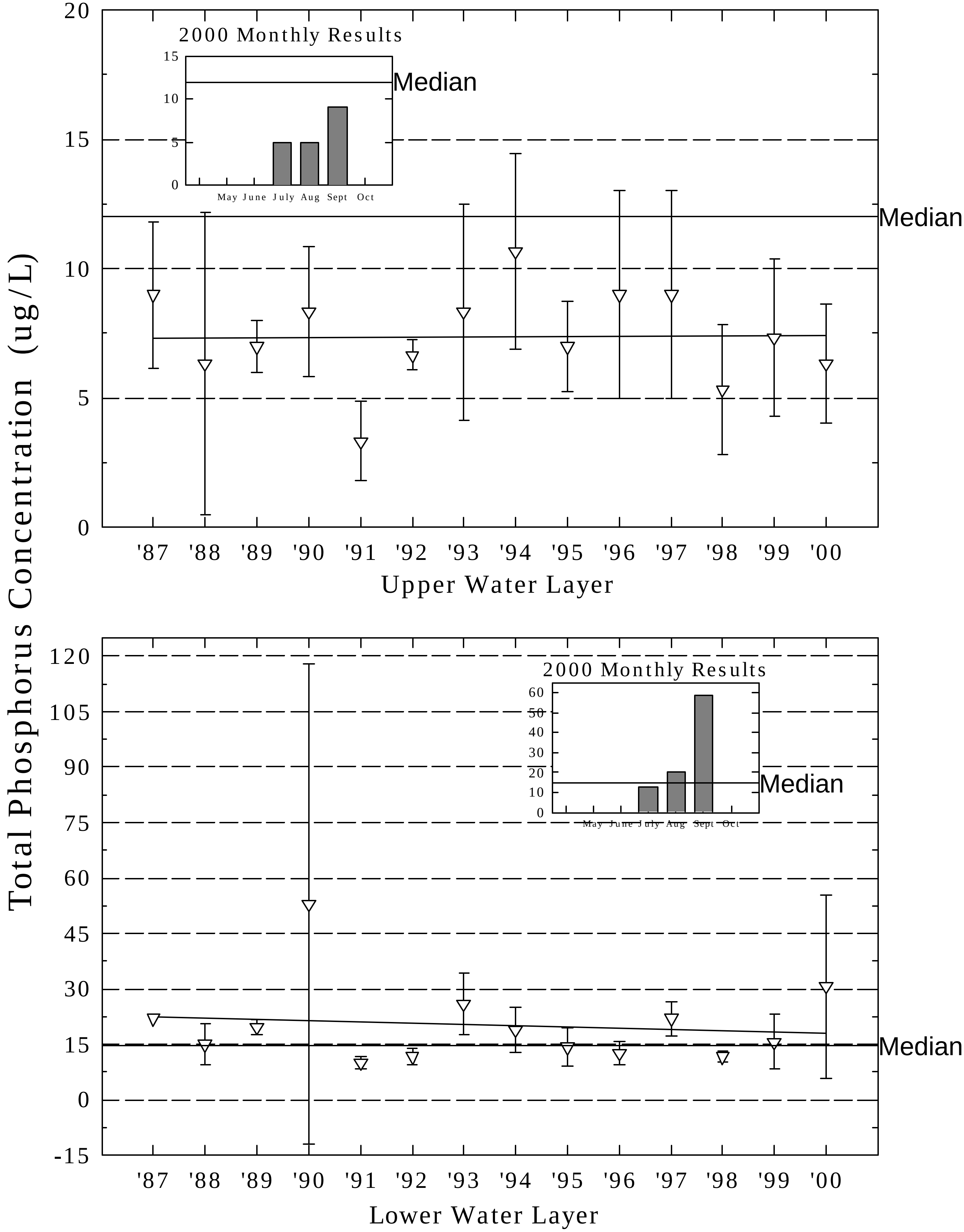


Table 1.

DEERING LAKE

DEERING

Chlorophyll-a results (mg/m^3) for current year and historical sampling periods.

Year	Minimum	Maximum	Mean
1987	2.59	2.60	2.59
1988	2.51	5.98	4.12
1989	1.99	20.19	8.92
1990	1.25	2.37	1.93
1991	1.82	2.35	2.15
1992	2.54	2.73	2.63
1993	1.33	1.99	1.70
1994	2.18	3.62	2.73
1995	1.83	1.99	1.91
1996	1.19	2.25	1.82
1997	1.80	2.54	2.22
1998	2.56	5.65	4.44
1999	2.02	4.05	2.99
2000	1.64	2.89	2.23

Table 1.

DEERING LAKE, STN 2

DEERING

Chlorophyll-a results (mg/m^3) for current year and historical sampling periods.

Year	Minimum	Maximum	Mean
1991	2.30	2.30	2.30
1992	4.20	4.20	4.20

Table 2.

DEERING LAKE

DEERING

Phytoplankton species and relative percent abundance.

Summary for current and historical sampling seasons.

Date of Sample	Species Observed	Relative % Abundance
07 / 22 / 1987	DINOBRYON	54
	RHIZOSOLENIA	36
06 / 29 / 1988	ASTERIONELLA	79
06 / 26 / 1990	ASTERIONELLA	89
06 / 23 / 1991	CHRYSOSPHAERELLA	38
	RHIZOSOLENIA	28
	ASTERIONELLA	15
06 / 15 / 1992	DINOBRYON	88
07 / 13 / 1993	ASTERIONELLA	86
06 / 20 / 1994	ASTERIONELLA	96
06 / 27 / 1995	ASTERIONELLA	82
	CHRYSOSPHAERELLA	14
	DINOBRYON	3
06 / 11 / 1996	DINOBRYON	17
	ANABAENA	6
	MALLOMONAS	2
07 / 23 / 1997	ASTERIONELLA	45
	DINOBRYON	31
	CHRYSOSPHAERELLA	23
07 / 31 / 1997	ASTERIONELLA	50
	CHRYSOSPHAERELLA	30
	DINOBRYON	12

Table 2.

DEERING LAKE

DEERING

Phytoplankton species and relative percent abundance.

Summary for current and historical sampling seasons.

Date of Sample	Species Observed	Relative % Abundance
07 / 23 / 1998	CHRYSOSPHAERELLA	61
	DINOBRYON	16
	CERATIUM	15
06 / 08 / 1999	ASTERIONELLA	88
	TABELLARIA	3
	DINOBRYON	3
07 / 17 / 2000	ASTERIONELLA	43
	RHIZOSOLENIA	16
	SYNURA	16

Table 3.

DEERING LAKE

DEERING

Summary of current and historical Secchi Disk transparency results (in meters).

Year	Minimum	Maximum	Mean
1987	5.8	6.4	6.1
1988	5.9	7.4	6.4
1989	4.5	5.5	5.0
1990	5.5	6.5	6.0
1991	6.0	6.5	6.2
1992	4.5	5.5	4.9
1993	6.0	6.5	6.2
1994	6.2	7.5	6.8
1995	6.1	7.3	6.7
1996	6.5	7.3	6.9
1997	5.3	7.2	6.1
1998	5.5	6.5	5.9
1999	4.3	6.0	5.1
2000	5.0	6.0	5.4

Table 4.

DEERING LAKE, STN B

DEERING

pH summary for current and historical sampling seasons.
Values in units, listed by station and year.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1992	6.76	6.76	6.76

Table 5.

DEERING LAKE

DEERING

Summary of current and historical Acid Neutralizing Capacity.
Values expressed in mg/L as CaCO .

Epilimnetic Values

Year	Minimum	Maximum	Mean
1987	4.80	4.80	4.80
1988	5.50	6.10	5.80
1989	4.00	5.10	4.57
1990	4.40	4.70	4.60
1991	5.30	6.50	5.93
1992	5.30	6.10	5.77
1993	5.20	6.10	5.77
1994	3.30	5.70	4.57
1995	4.80	5.40	5.13
1996	4.20	5.50	4.73
1997	4.30	5.40	4.93
1998	4.80	5.30	5.00
1999	3.50	5.50	4.83
2000	4.90	5.40	5.10

Table 6.

DEERING LAKE, STN B
DEERING

Specific conductance results from current and historic sampling seasons. Results in uMhos/cm.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1992	64.8	64.8	64.8

Table 8.

DEERING LAKE, STN B

DEERING

Summary historical and current sampling season Total Phosphorus data. Results in ug/L.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1992	6	6	6

Table 9.

DEERING LAKE

DEERING

Current year dissolved oxygen and temperature data.

Depth (meters)	**Temperature** (celsius)	**Dissolved Oxygen** (mg/L)	**Saturation** (%)
July 17, 2000			
0.1	22.3	8.6	99.2
1.0	22.3	7.9	91.0
2.0	22.2	7.7	88.1
3.0	22.2	5.9	67.5
4.0	22.2	5.1	58.5
5.0	22.1	4.9	55.6
6.0	18.7	5.0	53.7
7.0	14.3	4.2	40.6
8.0	12.5	2.0	19.1
9.0	11.0	1.0	9.0
10.0	10.0	1.2	10.5
11.0	9.7	1.5	13.1

Table 10.

DEERING LAKE

DEERING

Historic Hypolimnetic dissolved oxygen and temperature data.

Date	Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
July 22, 1987	11.0	8.0	0.8	7.0
June 29, 1988	9.5	9.4	-0.5	-3.0
June 26, 1990	10.0	11.7	0.7	6.4
June 23, 1991	9.0	12.0	0.5	4.6
July 15, 1992	9.5	8.2	0.7	5.9
July 13, 1993	11.0	8.3	0.2	2.0
June 20, 1994	9.0	12.3	4.3	40.0
June 27, 1995	9.5	10.1	1.1	10.0
June 11, 1996	9.5	10.0	2.1	19.0
July 23, 1997	10.0	12.3	0.8	7.0
July 31, 1997	10.0	12.5	0.7	6.0
July 23, 1998	9.0	11.1	0.2	2.0
June 8, 1999	8.5	11.0	6.2	56.0
July 17, 2000	11.0	9.7	1.5	13.1

Table 11.

DEERING LAKE

DEERING

Summary of current year and historic turbidity sampling.
Results in NTU's.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1997	0.2	0.3	0.2
	1998	0.3	0.6	0.4
	1999	0.3	0.5	0.4
	2000	0.2	0.3	0.3
HYPOLIMNION				
	1997	0.8	1.4	1.1
	1998	0.6	3.0	2.0
	1999	0.5	6.0	2.5
	2000	1.4	1.7	1.5
MAIN INLET				
	1997	1.0	2.4	1.7
	1998	0.3	1.5	1.0
	1999	0.3	1.0	0.6
	2000	0.3	1.1	0.6
METALIMNION				
	1997	0.2	0.6	0.3
	1998	0.5	0.6	0.5
	1999	0.4	0.5	0.5
	2000	0.3	0.3	0.3
MORROTTA INLET				
	1997	0.2	1.2	0.5
	1998	0.3	6.5	3.4
	1999	0.5	0.7	0.6
	2000	1.1	2.2	1.6
OUTLET				

Table 11.

DEERING LAKE

DEERING

Summary of current year and historic turbidity sampling.
Results in NTU's.

Station	Year	Minimum	Maximum	Mean
	1997	0.2	1.2	0.6
	1998	0.2	0.6	0.4
	1999	0.3	2.5	1.1
	2000	0.3	0.5	0.3
ZOWSKI INLET				
	1993	0.0	0.0	0.0
	1997	0.5	0.6	0.6
	1998	0.4	3.7	1.9
	1999	0.7	1.1	1.0
	2000	0.5	0.9	0.8